REMARKS

The present invention is directed to a lubricating oil composition exhibiting enhanced friction reducing properties both short term and over the long term under prolonged use under conditions in an engine. The lubricating oil composition comprises a lube oil base stock and a sulfoxymolydenum dithiocarbamate containing a hydrocarbon group having 8 to 18 carbon atoms, a zinc dialkyldithiophosphate (ZDDP) component selected from the group consisting of:

(i) ZDDP containing primary alkyl group having 1 to 18 carbon atoms;

(ii) a mixture of ZDDP containing primary alkyl groups having 1 to 18 carbon atoms and ZDDP containing secondary alkyl groups having 3 to 18 carbon atoms;

(iii) ZDDP containing primary alkyl groups containing 1 to 18 carbon atoms and one secondary alkyl group containing 3-18 carbon atoms; and

(iv) mixtures of (i), (ii) and (iii); and

an alkyl salicylate component comprising a mixture of magnesium alkyl salicylate and calcium alkyl salicylate wherein the magnesium alkyl salicylate does not exceed 50% by weight of said alkyl salicylate component,

wherein the amount of molybdenum derived from the sulfoxymolybdenum dithiocarbamate is from 200 to 1000 ppm (weight basis) of the total weight of the composition,

the amount of phosphorus derived from the zinc dialkyldithiophosphate component is from 0.04 to 0.15% by weight of the total weight of the compositions, and

the amount of alkyl salicylate component is from 0.5 to 10% by weight of the total weight of the composition.

Optionally a borated succinimide can also be present.

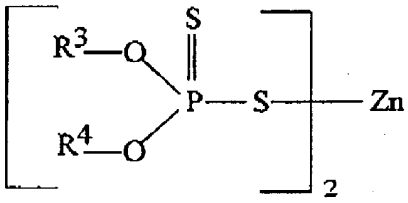
The Examiner rejects claims 1-5 under 35 USC § 112 second paragraph as being indefinite. She argues that in claims 1 and 2 (iii) it is not clear what type of alkyl group are represented by the unidentified term alkyl group.

Applicants respectfully traverse this rejection.

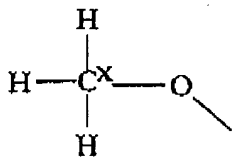
In claims 1 and 2 the term "alkyl group" is not an undefined term but rather, in each instance is identified either as a primary alkyl group containing 1-18 carbon atoms or a secondary alkyl group containing 3-18 carbons atoms.

Primary alkyl group and secondary alkyl groups are terms of art well known to organic chemists.

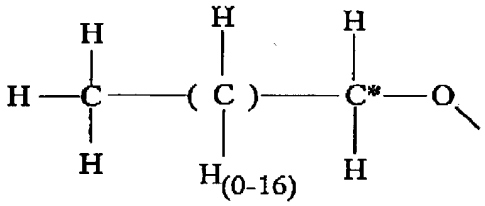
Referring to formula [2] at page 6 of the specification in



when R^3 and/or R^4 are primary alkyl groups they can contain 1 to 18 carbons. When the alkyl group (R^3 for example) contains 1 carbon it is represent by

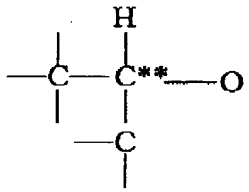


while if it contains 2 to 18 carbons it is represented by



wherein the carbon identified by the asterisk is the primary carbon (being attached directly to only 1 other carbon atom or no other carbon atoms) rendering the group a primary alkyl group.

When, for example R_3 is a secondary alkyl group having 3 to 18 carbons, it is represented by



the carbon identified by the two asterisks being the secondary carbon (being attached directly to 2 other carbon atoms) rendering the group a secondary alkyl group.

This is a convention will known and understood by organic chemists, see Organic Chemistry (3rd Ed.), Morrison and Boyd (1973, 1959), page 85 (attached).

The Examiner rejects claims 1 and 3-5 under 35 USC § 103(a) over Inoue (USP 5,744,430).

The Examiner argues that Inoue teaches an engine oil composition comprising base oil, alkaline earth metal salicylate detergent, zinc dialkyl dithiophosphate (ZDDP) a succinimide ashless dispersant, a molybdenum dithiocarbamate (MoDTC) and other additives.

The Examiner argues that although the reference describes the base oil in some detail, it would have been obvious to one of ordinary skill in the art to selected the claimed base oil because it would be recognized that hydrocracked oils are prepared by the most severe hydrotreatment process and would possess a sulfur content of 50 ppm or less and nitrogen content of 50 ppm or less.

The Examiner argues that alkaline earth metal salicylate detergents are recited in the reference and as including a mixture of calcium salicylate and magnesium salicylate, suggesting or 1:1 ratio. TBN's range from 60 to 350.

The Examiner argues that the reference teaches ZDDP wherein the alkyl groups have from 2 to 18 carbon atoms and may be primary, secondary or tertiary and may be a mixture of compounds with different alkyl groups. The reference also tracks MoDTC wherein the alkyl groups contain 2 to 18 carbons and the Mo content is 0.02-0.15 wt% (200-1500 ppm).

While the reference does not recite the total amount of alkaline earth salicylate no unobviousness is seen in this difference because the amount of ash is recited and those skilled in the art would recognize that the claimed amount would be required to obtain this quantity of ash.

Lack of recitation of composition TBN in the reference is dismissed because the TBN of the salicylate is given and oils containing the salicylate would possess the claimed TBN.

Applicants must respectfully traverse the rejection.

The claims of the present application have been redrafted as method claims, describing and claiming a method for lubricating an engine so as to maintain a reduction of friction for a prolonged time under the conditions of use in the engine by lubricating the engine with a particularly recited lubricating oil composition containing very specific additives.

This is not taught, suggested or implied in Inoue for the particularly claimed composition.

In Inoue the only examples are to engine oils containing ZDDP bearing secondary alkyl groups.

In the present application the difference in performance and in retention of friction reduction for prolonged periods between formulation containing ZDDP bearing secondary alkyl group versus ZDDP bearing primary alkyl groups is clearly demonstrated.

In Table 1 of the present application Comparative Example 1 reports on a formulation containing ZDDP bearing secondary alkyl groups. The coefficient of friction of the fresh oil is 0.141 while for the aged oil it is 0.190.

By comparison, for the oil of Example 1 (which is a direct comparison against Comparative Example 1) which contained ZDDP bearing primary alkyl groups the coefficient of friction for the fresh oil is 0.112 while for the aged oil it is 0.113.

Thus, quite unexpectedly and in no way taught, suggested or implied in Inoue, the lube oil containing ZDDP bearing primary alkyl groups is remarkably superior in both fresh and aged oil friction reduction, the oil containing ZDDP bearing primary alkyl

group retaining a low coefficient of friction for a prolonged time as compared against the oil containing ZDDP bearing secondary alkyl groups.

As previously stated, Inoue only demonstrated formulations containing ZDDP bearing secondary alkyl groups.

As demonstrated in the present case, such oils as those demonstrated in Inoue are inferior to the formulation presented in the present application. Consequently, they do not show the present method for retaining friction reduction for prolonged periods because, unexpectedly, formulations containing primary alkyl ZDDP are superior to the formulation containing secondary alkyl ZDDP.

Based on the teaching of the text of Inoue, one would not have expected there to be any difference between ZDDP's based on alkyl group type. This, however, was unexpectedly found not to be the case.

The Examiner rejects claim 2 under 35 USC § 103(a) based in Inoue in view of Inoue 4,529,526.

Inoue '526 is relied upon for its teaching that when succinimides are utilized they can be either borated or unborated.

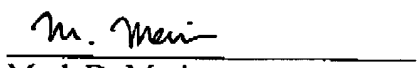
Thus, while Inoue '430 recites that the formulation contains as an essential ingredient an ashless succinimide, Inoue '526 is relied upon to show that the substitution of a borated succinimded for an ashless succinimide is within the ability of those skilled in the art and would have been obvious.

Applicants must respectfully traverse this rejection.

Because Inoue '430 has been addressed above and shown not to teach, suggest or imply the present method for friction reduction retention using lube formulation containing primary alkyl ZDDP which were unexpected shown in the present invention to be superior to the demonstrated formulation of Inoue '730 containing secondary alkyl ZDDP, and consequently removed as a reference, it is believed there is no need to address the combination rejection wherein the secondary reference is Inoue '526.

It is requested that the Examiner reconsider the case in light of the amendments made to the claims (composition claims amended into method claims and minor spelling and grammatical corrections also made), that she withdraw the rejection, allow the claims as mended and pass the case to issue in due course.

Respectfully submitted,



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[X] Pursuant to 37 CFR 1.34(a)

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Sheet 1 of 1

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U. S. PATENT DOCUMENTS

Examiner Initial *		Document Number	Date	Name	Class	Sub-Class	Filing Date
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
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	AH						
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FOREIGN PATENT DOCUMENTS

		Document Number	Publication Date	Country	Class	Sub-Class	Translation Yes	Translation No
	AJ							
	AK							
	AL							

OTHER DISCLOSURES (Include Author, Title, Date, Pertinent Pages, Place of Publication, etc.)

	AM	Robert T. Morrison and Robert N. Boyd (New York University), Organic Chemistry, Third Edition, May 1974, Sec. 3.12, Physical Properties, page 85.
	AN	

Examiner	Date Considered

* Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and NOT considered. Include copy of this form with next communication to applicant(s).

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Third Edition

ORGANIC CHEMISTRY

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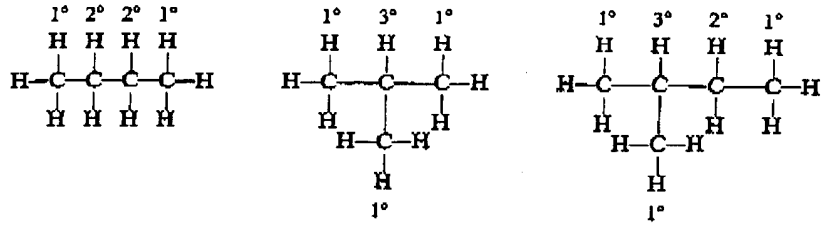
A **primary** *(1°) carbon atom is attached to only one other carbon atom; a* **secondary** *(2°) is attached to two others; and a* **tertiary** *(3°) to three others.* For example:



Each hydrogen atom is similarly classified, being given the same designation of *primary*, *secondary*, or *tertiary* as the carbon atom to which it is attached.

We shall make constant use of these designations in our consideration of the relative reactivities of various parts of an alkane molecule.

3.12 Physical properties

The physical properties of the alkanes follow the pattern laid down by methane, and are consistent with the alkane structure. An alkane molecule is held together entirely by covalent bonds. These bonds either join two atoms of the same kind and hence are non-polar, or join two atoms that differ very little in electronegativity and hence are only slightly polar. Furthermore, these bonds are directed in a very symmetrical way, so that the slight bond polarities tend to cancel out. As a result an alkane molecule is either non-polar or very weakly polar.

As we have seen (Sec. 1.19), the forces holding non-polar molecules together (van der Waals forces) are weak and of very short range; they act only between the portions of different molecules that are in close contact, that is, between the surfaces of molecules. Within a family, therefore, we would expect that the larger the molecule—and hence the larger its surface area—the stronger the intermolecular forces.

Table 3.3 lists certain physical constants for a number of the *n*-alkanes. As we can see, the boiling points and melting points rise as the number of carbons increases. The processes of boiling and melting require overcoming the intermolecular forces of a liquid and a solid; the boiling points and melting points rise because these intermolecular forces increase as the molecules get larger.

Except for the very small alkanes, *the boiling point rises 20 to 30 degrees for each carbon that is added to the chain*; we shall find that this increment of 20–30° per carbon holds not only for the alkanes but also for each of the homologous series that we shall study.

The increase in melting point is not quite so regular, since the intermolecular forces in a crystal depend not only upon the size of the molecules but also upon how well they fit into a crystal lattice.

The first four *n*-alkanes are gases, but, as a result of the rise in boiling point and melting point with increasing chain length, the next 13 (C_5—C_{17}) are liquids, and those containing 18 carbons or more are solids.